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A collection of freshwater fishes from the Kimberley region of Western Australia

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Abstract

Collections of freshwater fishes from the Kimberley region of northwestern Australia are reported. A series of 51 sites were sampled mainly with various types of nets. An annotated list of the 27 species collected is presented. Discussion concerning the composition, origin, and high percentage of endemism of the Kimberley ichthyofauna is included.

Introduction

Until recent times a knowledge of the freshwater fish fauna of Australia was far from complete. Thanks to important revisions of certain key groups this problem is partially rectified. Notable in this regard are reviews of Galaxiidae (McDowall and Frankenburg 1981), Atherinidae (Ivantsoff 1978), Melanotaeniidae (Allen and Cross 1982), Pseudomugilidae (Said, Ivantsoff, and Allen in press), Ambassidae (Allen and Burgess in press), Terapontidae (Vari 1978), and certain eleotridid genera (Hoese and Allen 1983 and 1987). In addition two recent books (Merrick and Schmida 1984; Allen 1989) summarised the entire Australian fauna. Nevertheless there remains a need for detailed regional studies, particularly in remote areas of the far north. There is still much to learn concerning the distributional limits of the northern species and especially about their biology. Moreover, there are probably a few undescribed species that await discovery, judging from recent collections. The Kimberley region of north-western Australia is one area in particular that is worthy of study. Previous expeditions to the Prince Regent, Drysdale, and Mitchell rivers have resulted in the discovery of 15 new species (Allen 1975c; Hutchins 1977 and 1981). Equally important, these studies reveal that the Kimberley represents an important biological province characterised by a significant portion of endemic species.

The present paper reports collections made over a wide area (Figure 1) of the Kimberley region by R. Leggett with the assistance of G. Heidke during July-August 1986. The trip was achieved by use of a 4-wheel drive vehicle and collections in larger waterholes were aided by a 2.4 metre aluminium boat. Many previously unsampled sites were visited and the collections therefore yielded useful distributional data and at least two undescribed species.

Methods

Fish specimens were collected with several types of nets. An 8 mm-mesh seine measuring eight metres in length was used mainly over sand and rock bottoms, both during the day

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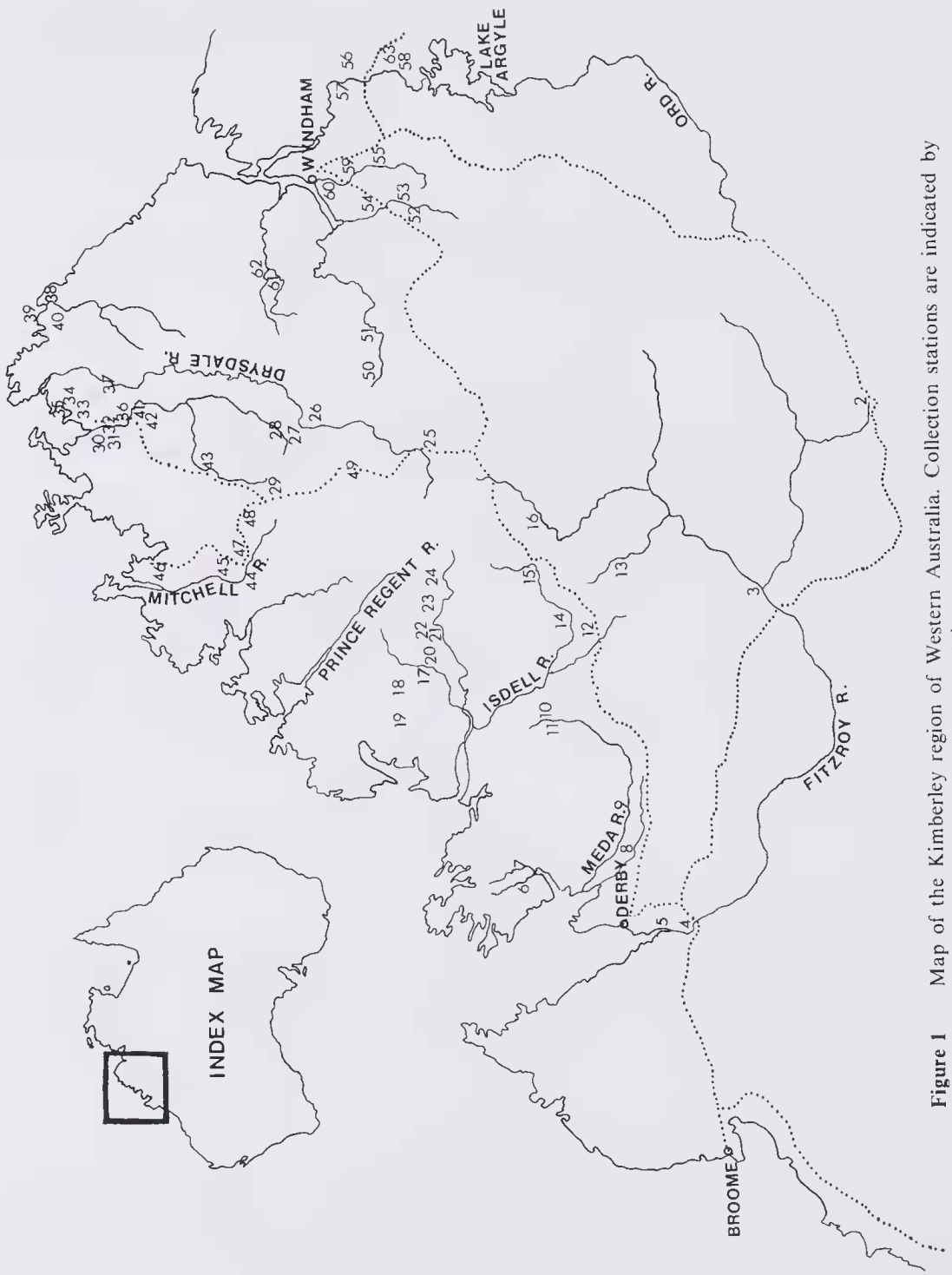

Figure 1 Map of the Kimberley region of Western Australia. Collection stations are indicated by numbers. Roads are shown as dotted lines

and at night. Occasionally bait was placed in the centre of the net and it was then hauled 3-4 hours later, usually after dark. This method was particularly effective for catching terapontids and plotosids. Gill nets of variable mesh size (20 mm, 60 mm, 75 mm, and 100 mm) were set at night. A dig net (named after the digging action) was used to collect along stream banks and amongst log snags and aquatic plants. This was a 45 x 75 cm steel frame with fly-screen mesh, attached to a metal pipe handle. It was generally used at night with a head torch. Rotenone powder was utilised on a few occasions when it was impractical to use other methods. A fishing rod and a variety of spinners and fish bait was also used, particularly for larger terapontids.

The station data for 51 of 63 sites visited is presented below. Certain stations (i.e. 1, 20, 31, etc.) are omitted if no fishes were collected. The collectors for all stations were R. Leggett and G. Heidke, except 59-61 were obtained by R. Leggett alone.

Measurements of pH were recorded with a bromythymal blue test kit (range 5.5-8.5) and total water hardness values (TH) were obtained with a titration test that gave the measurement in ppm CaCo3.

Specimens are deposited at the Queensland Museum (subsequently abbreviated QM). In the list of species presented below abbreviated literature citations are given for the original description and its coverage in Allen's "Inland Fishes of Western Australia" (1982), which also refers to a colour photograph of most species. Complete literature citations are given in the references section at the end of the paper. Annotations for individual species include number of specimens collected, their size range, and overall geographic distribution. Additional information is provided under the first species within a particular family regarding recent taxonomic studies and the number of representatives in the Australia-New Guinea region.

List of Stations

(2) Palm Springs, Fitzroy River system (18°42'S, 126°52'E), 10 July 1986; dig net along banks and with head torch at night and seine net over sand and rock bottom, depths to 75 cm; water clear, slight flow, 24°C, TH 70 ppm, pH 7.4.

(3) Geikie Gorge, Fitzroy River, ½ km upstream from National Park boundary (18°04'S, 125°45'E); 12 July 1986; seine net over mud and sand bottom, depths to 1 m; water clear, no flow, 24°C, TH 70 ppm, pH 7.4.

(4) Waterhole 200 m downstream from bridge over Fitzroy River, 13 km from Derby-Fitzroy crossing road junction on Broome road (17°45'S, 123°39'E); 13 July 1986; seine net over mud bottom, depths to 60 cm; water muddy (Secci disc 90 mm), no flow; 26°C; TH 80 ppm, pH 7.4.

(5) Small isolated pools in salt marsh delta of Fitzroy River (17°32'S, 123°35'E); 13 July 1986; seine net over mud bottom, depths to 30 cm; water muddy (Secci disc 120 mm), slightly saline, no flow, 26°C.

(6) Stewart River at Kimbolton Station road crossing (16°44'S, 125°54'E); 15 July 1986; seine net over sand bottom, depths to 1.5 m, dig net along banks; water clear, slight flow, 24°C, TH 30 ppm, pH 7.0.

(7) Keightly River, 60 m downstream from Kimbolton Station road crossing (16°44′S, 123°59′E); 16 July 1986; dig net over sandy bottom, depths to 50 cm; also rotenone in small isolated waterhole to side of main channel; water clear, medium flow, 25°C, TH 30 ppm, pH 7.0.

(8) May River, shallow waterhole on Meda Station (17°23′S, 124°02′E); 17 July 1986; seine net over mud and shale bottom, depths to 1 m; water turbid (Secci disc 600 mm), no flow, 28°C, TH 25 ppm, pH 7.8.

(9) Lennard River, Meda River System, Snow's waterhole on Kimberley Downs Station (17°21′S, 124°21′E), 18-19 July 1986; seine net, depths to 1.5 m, dig net along banks, 50 mm and 100 mm gill nets set across waterhole at night (5 pm to 9 pm), and head torch with dip net; bottom mud and sand bottom; water turbid (Secci disc 800 mm), no flow, 24°C, TH 40 ppm, pH 7.8.

(10) Barker River, Meda River System of Mt. Hart Station (16°50′S, 124°55′E); 20 July 1986; seine net over sand and rock bottom, depths to 1 m, 20 mm and 50 mm gill nets set across river at night (5 pm to 7 am), and head torch with dip net; water clear, slight flow, 24°C, TH 10 ppm, pH 7.0.

(12) Concrete culvert on Gibb River road at Saddle Spring, tributary of Grave Creek, Isdell River System (17°09′S, 125°28′E); 22 July 1986; rotenone and dip net; water clear, slight flow, 24°C, TH 10 ppm, pH 7.2.

(13) Adcock River, Fitzroy River System, at Lungra Yards on Mt. House Station (17°13′S, 125°49′E); 23 July 1986; seine net over sand and rock bottom, depths to 75 cm, rotenone and dip nets with head torch; water clear, no flow, 22°C, TH 50 ppm, pH 7.2.

(14) 'Fishole', northwest of Clancy's Yard on Mt. House Station, Isdell River System (17°00′S, 125°30′E); 24-26 July 1986; seine net over sand and rock bottom with bait, depths to 1.5 m, dig net along bank, 75 mm and 100 mm gill nets set across waterhole at night (5 pm to 10:30 pm), head torch and rotenone; water clear, medium flow, 22°C, TH 30 ppm, pH 7.2.

(15) Galvan's Gorge, Isdell River System, 1 km downstream from gorge and waterfall (16°48′S, 125°46′E); 26 July 1986; depths to 50 cm; water clear, slight flow, 26°C, TH 5 ppm, pH 7.2.

(16) Junction of Hann and Barnett rivers, Fitzroy River system (16°51′S, 126°03′E); 27-28 July 1986; seine net with bait, depths to 1 m (night and day), 75 mm gill net set across river (2-7 pm) and head torch; bottom sand and rock; water in Barnett R. clear, Hann R. turbid (Secci disc 900 mm), slight flow in both rivers, 26°C and TH 5 ppm, pH 7.0 in both rivers.

(17) Calder River, 250 m upstream from mustering track at Mt. Elizabeth Station (16°03′S, 125°13′E); 28-31 July 1986; seine net with bait, depths to 1 m (night and day), dig net along bank, fishing rod, head torch and rotenone; sand bottom with large rocks; water clear, medium flow, 22°C, TH 2 ppm, pH 7.0.

(18) Sale River, 3 km from Pantijan Station along airstrip road (15°57′S, 125°04′E); 31 July 1986; seine net over sand and rock bottom, depths to 1 m; water clear, slight flow, 22°C, TH 10 ppm, pH 7.0.

(19) Tributary of Sale River, 6 km south of Pantijan Station on track to Calder River (16°00′S, 125°5′E); 31 July 1986; dig net on sandy bottom, depths to 50 cm; water clear, no flow, 22°C, TH 10 ppm, pH 7.0.

(21) Ray's Swamp, Calder River system, small swampy water holes on both side of track, 15 km east of Calder River Camp (16°01′S, 125°15′E); 2 August 1986; dig net over mud bottom, depths to 1.5 m; water clear with slight tea colour, no flow, 25°C, TH 0 ppm, pH 6.2.

(22) Bashsten Creek, Calder River system, on Mt. Elizabeth Station mustering track (16°01′S, 125°18′E); 2 August 1986; dig net over sand bottom, depths to 50 cm; water clear, slight flow, 23°C, TH 0 ppm, pH 7.0.

(23) Pearson River, Charnley River system, on Calder River Mt. Elizabeth Station track (16°02′S, 125°36′E); 3 August 1986; dig net over sand and rock bottom amongst plants, depths to 1 m; head torch and rotenone; water clear, slight flow, 22 C, TH 0 ppm, pH 6.8.

(24) Maudie Creek, Charnley River system, on Calder River Mt. Elizabeth Station track (16°07′S, 125°46′E); 3-4 August 1986; seine net with bait (night and early morning) on rock plate bottom; water clear, medium flow, 22°C, TH 0 ppm, pH 7.0.

(25) Gibb River, Drysdale River system, at Kalumburu Road crossing (16°11′S, 126°31′E); 4 August 1986; seine net over sandy bottom, depths to 1 m; water slightly turbid, very slight flow, 23°C, TH 0 ppm, pH 7.0.

(26) Drysdale River, southeast corner of Doongan Station (15°28′S, 126°39′E); 4-6 August 1986; dig net amongst plants, 20 mm gill net set in water hole, head torch and fishing rod; water clear, medium flow, 23°C, TH 15 ppm, pH 7.4.

(27) Tributary of Carson River, second creek south from Old Doongan Station on road to Doongan Station (15°21′S, 126°31′E); 7 August 1986; seine net over sand and rock bottom, depths to 1 m; water turbid (Secci disc 600 mm), no flow, 20°C, TH 10 ppm, pH 7.0.

(28) Waterhole on Carson River (15°20′ S, 126°35′E); 7 August 1986; dig net along banks, mud bottom; water muddy (Secci Disc 300 mm), no flow, 24°C, TH 10 ppm, pH 7.0.

(29) Creek at Drysdale River trucking yard off Kalumburu Road, Drysdale River system (15°36′S, 126°21′E); 8 August 1986; dig net over sandy bottom, depths to 1 m; water clear, very slight flow, 21°C, TH 0 ppm, pH 6.3.

(30) Monger Creek, 10 km west of Kalumburu Settlement at track crossing (17°17′S, 126°33′E); 10 August 1986; seine net, depths to 1.5 m over gravel bottom, dig net aong banks, and fishing rod; water clear, medium-strong flow, 23°C, TH 10 ppm, pH 6.8.

(32) King Edward River at Monger Creek track crossing (14 18′S, 126 38′E); 10 August 1986; dig net, depths to 1 m along banks; rock and sand bottom, water clear, strong flow, 21°C, TH 5 ppm, pH 7.0.

(33) Dominic Creek (14°10′S, 126°42′E); 11 August 1986; seine net at depths to 1 m and dig net along banks; rock and sand bottom; water clear, no flow, 27°C, TH 0 ppm, pH 6.4.

(34) Small creek adjacent to Pago Ruins, above rock bar (140°7′S, 126°43′E); 11 August 1986; dig net along banks, depths to 1 m; rock and sand bottom; water clear, no flow, 27°C, TH 0 ppm, pH 6.5.

(37) Sandz Crossing on Drysdale River (14°26′S, 126°52′E); 12 August 1986; seine net with bait at night, head torch, and fishing rod; sand and rock bottom; water clear, medium flow, 26°C, TH 10 ppm, pH 7.0.

(38) King George River at top of Gorge Falls, small pools in rock (14°03′S, 127°19′E); 13 August 1986; seine net, depths to 1 m over rock bottom, dig net and rotenone; water clear, no flow, 26°C, TH 0 ppm, pH 7.0.

(40) Lagoon, King George River system, 10 km inland on track to beach (14°03′S, 127°13′E); 15 August 1986; seine net, depths to 1.5 m; mud and leaves over sand and rock bottom; water clear, but slightly stained, no flow, 24°C, TH 0 ppm, pH 6.0.

(41) Homestead swimming hole, 1 km downstream from Carson River Station, Carson River system (14°29′S, 126°45′E); 16 August 1986; seine net over rocky bottom, depths to 1 m; water slightly discoloured, medium to strong flow, 24°C, TH 10 ppm, pH 7.6.

(42) Tributary of King Edward River, 8 km south of Kalumburu Road and Carson River crossing (14°28′S, 126°38′E); 16 August 1986; dig net over rocky bottom, depths to 35 cm; water clear, slight flow, 22°C, TH 200 ppm, pH 7.8.

(43) Rock pools in Morgan River, Carson River system, 2 km from Theda Station (14°48′S, 126°29′E); 16 August 1986; seine net over rock bottom, depths to 1 m; water clear, no flow; 23°C, TH 20 ppm, pH 7.6.

(44) Camp Creek, Mitchell River system, 8 km south of Mitchell Plateau Mining Camp (14°53′S, 125°47′E); 16 August 1986; dig net along banks, depths to 1 m; silt on gravel bottom; water slightly turbid (Secci disc 1.8 m), medium flow, 22°C, TH 10 ppm, pH 6.4.

(45) Above Merten's Falls, Mitchell River (14°48′S, 125°43′E); 17 August 1986; seine net over sand and rock bottom, depths to 1.5 m, dig net amongst plant and rocks; water slightly turbid (Secci disc 1.6 m), slight flow, 24°C, TH 10 ppm, pH 6.8.

(46) Crystal Creek, draining into Admiralty Gulf (14°30′S, 125°46′E); 18 August 1986; seine net over rock bottoms, depths to 50 cm; water clear, very slight flow, 26°C, TH 0 ppm, pH 7.6.

(47) Tributary of Mitchell River, creek crossing .5 km east of Mining Camp of Mitchell Plateau Track (14°52′S, 125°53′E); 18 August 1986; seine net over rock bottom, depths to 1 m and dig net along banks; water clear, medium current, 24°C, TH 10 ppm, pH 6.8.

(48) King Edward River at Mitchell Plateau Road Crossing (15°07′S, 126°08′E); 19 August 1986; dig net amongst plants and along banks, bottom gravel, depths to 1 m; water clear, medium flow, TH 8 ppm, pH 6.4.

(49) Drysdale River, at Gibb River road crossing (15°41′S, 126°23′E); 20 August 1986; seine net over sand bottom, depths to 1.5 m; water clear, strong flow, 23°C, TH 0 ppm, pH 6.8.

(50) Dawn Creek, Durack River system, small waterhole on upstream side of Gibb River-Wyndham Road crossing (15°59′S, 127°01′E); 20 August 1986; seine net over rock bottom; water turbid (Secci disc 600 mm), no flow, 22°C, TH 20 ppm, pH 7.6.

(51) Large (4 x .5 km) waterhole on Durack River, 800 m downstream side of road crossing on Wyndham Road (15°56′S, 127°13′E); 20 August 1986; seine net with bait (day and night) over rock and sand bottom, depths to 1.5 m, and head torch; water turbid (Secci disc 600 mm), no flow, 24°C, TH 20 ppm, pH 7.8.

(52) Chamberlain Gorge, Pentecost River system (15°59′S, 127°55′E); 21 August 1986; 20 mm gill net set out from gorge wall (1-3 pm); water clear, no flow, 24°C, TH 10 ppm, pH 8.0.

(53) Pentecost River, waterhole (100 x 20 m), 2 km downstream from El Questro Station (16°00′S, 127°59′E); 21-22 August 1986; seine net with bait (day and night) over rock and sand bottom, depths to 1.5 m, dig net along banks and head torch; water clear, no flow, 25°C, TH 10 ppm, pH 7.8.

(54) Pentecost River, track crossing 300 m from El Questro Station (16°01′S, 127°59′E); 22 August 1986; seine net over rock bottom, depths to 1 m and dig net along banks; water clear, medium flow, 23°C, TH 10 ppm, pH 7.8.

(56) Lake Kununurra, Ord River system, at ramp near caravan park (15°48′S, 128°41′E); 23 August 1986; seine net over mud bottom, depths to 1 m and dig net in reeds; water clear, no flow, 25°C, TH 120 ppm, pH 7.8.

(59) Tributary of Ord River, small pool, 30 m downstream from 'Grotto' on Kununurra-Wyndham Road (15°43′S, 128°15′E); 26 August 1986; dig net, depths to 1.5 m; water turbid (Secci disc 500 mm); no flow, 25°C, TH 10 ppm, pH 7.2.

(60) Shallow waterhole, King River system, on King River Dam road, 18 km from Wyndham Road (15°38′S, 128°05′E); 27 August 1986; dig net amongst plants, depths to 1 m; mud and sand bottom; water tea coloured, no flow, 25°C, TH 110 ppm, pH 7.8.

(61) Warringali Creek, Forrest River system, 20 m upstream from track to Forrest River Aboriginal Settlement (15°10′S, 127°41′E); 28 August 1986; dig net, depths to 1 m over rock and sand bottom and head torch; water clear, no flow, 26°C, TH 20 ppm, pH 7.4.

Annotated List of Species

Family Clupeidae — Herrings or Bony Bream

Nematalosa erebi (Günther)

Chatoessus erebi Günther 1868: 407 (Mary River, Queensland).
Nematalosa erebi. Allen 1982: 29, pl. 7.

374 specimens: 20-139 mm SL. Sta. 2 (QM 22414), 2 specimens, 40-47 mm SL; Sta. 3 (QM 22415), 69 specimens, 25-38 mm SL; Sta. 4 (QM 22423), 189 specimens, 16-85 mm SL; Sta. 4 (QM 22426), 3 specimens, 38-53 mm SL; Sta. 6 (QM 22433), 1 specimen, 139 mm SL; Sta. 8 (QM 22445), 11 specimens, 73-114 mm SL; Sta. 8 (QM 22447), 1 specimen, 38 mm SL; Sta. 9 (QM 22452), 9 specimens; 34-131 mm SL; Sta. 9 (QM 22455), 12 specimens, 40-75 mm SL; Sta. 14 (QM 22480), 3 specimens, 67-83 mm SL; Sta. 16. (QM 22486), 5 specimens, 68-70 mm SL; Sta. 26 (QM 22518), 2 specimens, 97-99 mm SL; Sta. 37 (QM 22401), 12

specimens, 70-74 mm SL; Sta. 49 (QM 22587), 3 specimens, 89-90 mm SL; Sta. 50 (QM 22592), 15 specimens, 20-72 mm SL; Sta. 50 (QM 22594), 9 specimens, 37-53 mm SL; Sta. 51 (QM 22598), 22 specimens, 42-46 mm SL; Sta. 51 (QM 22599), 3 specimens, 39-66 mm SL.

The Australian herrings of the genus *Nematalosa* were reviewed by Nelson and Rothman (1973). The group is represented by three freshwater species in Australia and southern New Guinea. *Nematalosa erebi* is widely distributed in the northern two-thirds of Australia and southern New Guinea.

Family Plotosidae — Eel-tailed Catfishes
***Neosilurus hyrtlii* (Steindachner)**

Neosilurus hyrtlii Steindachner 1867: 14 (Fitzroy River, Queensland).
Neosilurus hyrtlii. - Allen 1982: 35, fig. 4 and pl. 7.

72 specimens: 48-150 mm SL. Sta. 3 (QM 22420), 1 specimen, 123 mm SL; Sta. 9 (QM 22454), 1 specimen; 99 mm SL; Sta. 12 (QM 22466), 15 specimens, 61-88 mm SL; Sta. 13 (QM 22470), 1 specimen, 94 mm SL; Sta. 14 (QM 22476), 1 specimen, 150 mm SL; Sta. 15 (QM 22483), 1 specimen, 58 mm SL; Sta. 17 (QM 22491), 4 specimens, 64-83 mm SL; Sta. 24 (QM 22513), 28 specimens, 80-82 mm SL; Sta. 29 (QM 22529), 3 specimens, 48-52 mm SL; Sta. 37 (QM 22553), 1 specimen, 90 mm SL; Sta. 38 (QM 22557), 1 specimen, 57 mm SL; Sta. 44 (QM 22572), 2 specimens, 69-70 mm SL; Sta. 51 (QM 22600), 11 specimens, 93-105 mm SL; Sta. 59 (QM 22619), 1 specimen, 79 mm SL.

The plotosid catfishes of Australia and New Guinea are currently being studied by Feinberg and Allen. *Neosilurus* contains four species which are restricted to northern and central Australia. *N. hyrtlii* is widely distributed across the northern half of Australia from the Kimberleys to eastern Queensland.

***Neosilurus* sp.**

Neosilurus sp. - Allen 1982: 36, pl. 7.

6 specimens, 90-130 mm SL (QM 22492, Sta. 17).

A new species that has been collected on several previous expeditions. It is one of two undescribed species characterised by a flexible spine at the beginning of the dorsal and pectoral fins (spine stiff and sharp in other plotosids). The species will be described by Feinberg and Allen. Distributed in the Kimberleys and adjacent Northern Territory.

Family Melanotaeniidae — Rainbowfishes
***Melanotaenia exquisita* Allen**

Melanotaenia exquisita Allen 1978a: 97, fig. p. 96 (Edith River, Northern Territory).

41 specimens: 19-39 mm SL. Sta. 38 (QM 22556), 11 specimens, 20-39 mm SL; Sta. 40 (QM 22564), 30 specimens, 19-32 mm SL.

Allen and Cross (1982) reviewed the melanotaeniids. It is the largest family of freshwater fishes that is entirely restricted to the Australia-New Guinea region, containing about 50 species in seven genera. *Melanotaenia exquisita* was previously known only from the Daly and Mary river systems of the Northern Territory. Therefore,

the specimens from the King George system represent a new record for Western Australia and a westward extension of the known range of nearly 500 km.

Melanotaenia gracilis Allen

Melanotaenia gracilis Allen 1978a: 98, fig. p. 96 (Drysdale River, Western Australia).

1049 specimens: 23-60 mm SL. Sta. 26 (QM 22516), 60 specimens, 23-50 mm SL; Sta. 37 (QM 22402), 673 specimens, 14-60 mm SL; Sta. 49 (QM 22585), 216 specimens, 25-60 mm SL.

Melanotaenia gracilis is known only from the Drysdale River system and the nearby King Edward system in the eastern Kimberley region.

Melanotaenia nigrans (Richardson)

Atherina nigrans Richardson 1843: 180 (near Darwin, Northern Territory).
Melanotaenia nigrans. - Allen and Cross 1982: 53, figs. pp. 34 and 38.

125 specimens: 15-53 mm SL. Sta. 33 (QM 22544), 97 specimens, 22-43 mm SL; Sta. 34 (QM 22547), 28 specimens, 15-53 mm SL.

This species was previously known from coastal streams of the Northern Territory and the northern half of Cape York Peninsula. Therefore the specimens from the vicinity of Napier Broome Bay constitute a new record for Western Australia and a westward extension of the distributional range of about 500 km.

Melanotaenia splendida australis (Castelnau)

Neoatherina australis Castelnau 1875: 32 (Western Australia).
Melanotaenia splendida australia. - Allen 1982: 38, pl. 8.

1934 specimens: 10-66 mm SL. Sta. 2 (QM 22409), 83 specimens, 20-66 mm SL; Sta. 6 (QM 22432), 51 specimens, 14-45 mm SL; Sta. 7 (QM 22441), 71 specimens, 14-47 mm SL; Sta. 8 (QM 22446), 7 specimens, 41-49 mm SL; Sta. 9 (QM 22453), 37 specimens, 16-53 mm SL; Sta. 10 (QM 22459), 137 specimens, 29-61 mm SL; Sta. 12 (QM 22465). 172 specimens, 20-60 mm SL; Sta. 13 (QM 22469), 129 specimens, 18-48 mm SL; Sta. 14 (QM 22475), 47 specimens, 17-44 mm SL; Sta. 15 (QM 22482), 10 specimens, 17-36 mm SL; Sta. 16 (QM 22484), 98 specimens, 33-54 mm SL; Sta. 17 (QM 22490), 191 specimens, 29-61 mm SL; Sta. 18 (QM 22496), 16 specimens, 30-64 mm SL; Sta. 19 (QM 22497), 1 specimen, 31 mm SL; Sta. Sta. 21 (QM 22501), 95 specimens, 10-35 mm SL; Sta. 22 (QM 22502), 9 specimens, 20-35 mm SL; Sta. 23 (QM 22506), 24 specimens, 27-41 mm SL; Sta. 24 (QM 22514), 62 specimens, 24-25 mm SL; Sta. 26 (QM 22515), 8 specimens, 29-56 mm SL; Sta. 27 (QM 22524), 14 specimens, 27-38 mm SL; Sta. 28 (QM 22526), 2 specimens, 21-23 mm SL; Sta. 29 (QM 22528), 16 specimens, 17-31 mm SL; Sta. 30 (QM 22533), 62 specimens, 17-57 mm SL; Sta. 30 (QM 22541), 3 specimens, 39-62 mm SL; Sta. 38 (QM 22555), 95 specimens, 25-57 mm SL; Sta. 42 (QM 22567), 42 specimens, 22-47 mm SL; Sta. 43 (QM 22569), 32 specimens, 23-40 mm SL; Sta. 44 (QM 22571), 68 specimens, 20-56 mm SL; Sta. 45 (QM 22576), 51 specimens, 22-52 mm SL; Sta. 46 (QM 22579), 15 specimens, 31-39 mm SL; Sta. 47 (QM 22582), 10 specimens, 22-49 mm SL; Sta. 48 (QM 22583), 28 specimens, 20-46 mm SL; Sta. 49 (QM 22584), 40 specimens, 29-57 mm SL; Sta. 50 (QM 22592), 60 specimens, 30-52 mm SL; Sta. 51 (QM 22596), 49 specimens, 30-58 mm SL; Sta. 54 (QM 22609), 10 specimens, 28-60 mm SL; Sta. 55 (QM 22610), 29 specimens, 26-62 mm SL; Sta. 59 (QM 22618), 4 specimens, 38-40 mm SL; Sta. 60 (QM 22620), 6 specimens, 13-35 mm SL.

Four subspecies of *Melanotaenia splendida* occur in northern and central Australia and a fifth inhabits southern New Guinea. *M. splendida australis* is distributed in northern Western Australia north of the Ashburton River (about 24°00'S) and the northwestern part of the Northern Territory. It is extremely abundant throughout the Kimberley region.

Family Atherinidae — Hardyheads

Craterocephalus helenae Ivantsoff, Crowley and Allen

Craterocephalus helenae Ivantsoff, Crowley and Allen 1987: 177, fig. 3 (Drysdale River, Western Australia).
Craterocephalus sp. A. - Allen 1982: 40, pl. 9.

149 specimens: 25-69 mm SL. Sta. 26 (QM 22517), 3 specimens, 52-57 mm SL; Sta. 37 (QM 22400), 143 specimens, 25-69 mm SL; Sta. 49 (QM 22586), 3 specimens, 59-63 mm SL.

Ivantsoff (1978) reviewed *Craterocephalus,* a genus restricted to the Australia-New Guinea region and containing about 15 marine and freshwater species. *C. helenae* is known only from the Drysdale River system in the eastern Kimberley district.

Craterocephalus lentiginosus Ivantsoff, Crowley and Allen

Craterocephalus lentiginosus Ivantsoff, Crowley and Allen 1987: 175, fig. 2 (Roe River, Western Australia).
Craterocephalus sp. B. - Allen 1982: 41, pl. 9.

34 specimens: 12-42 mm SL. Sta. 3 (QM 22417), 22 specimens, 12-30 mm SL; Sta. 4 (QM 22424), 3 specimens, 38-42 mm SL; Sta. 5 (QM 22431), 1 specimen, 39 mm SL; Sta. 32 (QM 22542), 8 specimens, 19-27 mm SL.

This species was previously known only from streams within the Prince Regent River Reserve in the western Kimberley district. The specimens from the Fitzroy system therefore extend the range southwards by about 300 km.

Quirichthys stramineus (Whitley)

Quiris stramineus Whitley 1950: 239 (Katherine River, Northern Territory).
Quirichthys stramineus. - Allen 1982: 41, pl. 9.

103 specimens: 25-46 mm SL. Sta. 2 (QM 22410), 5 specimens, 25-45 mm SL; Sta. 56 (QM 22614), 98 specimens, 10-46 mm SL.

The monotypic *Quirichthys* is known only from a few northern Australian river systems including the Ord of Western Australia, the Victoria, Daly, and Katherine of the Northern Territory, and the Gregory of Queensland.

Family Chandidae — Glassfishes

Ambassis macleayi Castelnau

Ambassis macleayi Castelnau 1878: 43 (Norman River, Queensland).
Ambassis macleayi. - Allen 1982: 44, pl. 9.

6 specimens: 16-37 mm SL. Sta. 30 (QM 22537), 4 specimens, 16-26 mm SL; Sta. 56 (QM 22615), 2 specimens, 33-37 mm SL.

The 22 species of chandids inhabiting Australia and New Guinea were recently reviewed by Allen and Burgess (in press). *Ambassis macleayi* is widely distributed in rivers of northern Australia and southern New Guinea that drain into the Timor and Arafura seas, and the Gulf of Carpentaria.

Ambassis mulleri Klunzinger

Ambassis mulleri Klunzinger 1879: 346 (Darwin, Northern Territory).
Ambassis agrammus. - Allen 1982: 44, pl. 9.

521 specimens, 10-51 mm SL. Sta. 3 (QM 22416), 3 specimens, 10-29 mm SL; Sta. 4 (QM 22425), 5 specimens, 27-30 mm SL; Sta. 6 (QM 22433), 141 specimens, 19-31 mm SL; Sta. 8 (QM 22450), 38 specimens, 34-51 mm SL; Sta. 9 (QM 22456), 1 specimen, 34 mm SL; Sta. 10 (QM 22463), 14 specimens, 24-35 mm SL; Sta. 22 (QM 22504), 4 specimens, 17-20 mm SL; Sta. 23 (QM 22509), 2 specimens; 28-31 mm SL; Sta. 26 (QM 22519), 1 specimen, 30 mm SL; Sta. 29 (QM 22530), 9 specimens, 12-21 mm SL; Sta. 33 (QM 22545), 97 specimens, 22-31 mm SL; Sta. 37 (QM 22554), 50 specimens, 23-35 mm SL; Sta. 38 (QM 22558), 75 specimens, 10-35 mm SL; Sta. 44 (QM 22573), 7 specimens, 24-33 mm SL; Sta. 45 (QM 22577), 4 specimens, 23-25 mm SL; Sta. 51 (QM 22597), 60 specimens, 25-37 mm SL; Sta. 53 (QM 22606), 1 specimen, 22 mm SL; Sta. 55 (QM 22612), 1 specimen, 27 mm SL; Sta. 60 (QM 22621), 7 specimens, 24-29 mm SL; Sta. 61 (QM 22624), 1 specimen, 25 mm SL.

Most recent authors have referred to this species as *Ambassis agrammus* Günther, but according to Allen and Burgess (in press) the two are distinct. *A. agrammus* occurs on Cape York Peninsula and in coastal streams of the Northern Territory; it is also found in the central part of southern New Guinea. *A. mulleri* ranges throughout the Kimberley region and the adjacent Northern Territory (except it is replaced in coastal areas by *A. agrammus*). It also occurs in central Australia including the Lake Eyre drainage system.

Family Teraponidae — Grunters

Amniataba percoides (Günther)

Therapon percoides Günther 1864: 374 (Fitzroy River, Queensland).
Amniataba percoides. - Allen 1982: 46, pl. 10.

73 specimens: 13-86 mm SL. Sta. 2 (QM 22413) 4, specimens, 38-51 mm SL; Sta. 3 (QM 22419), 5 specimens, 13-86 mm SL; Sta. 4 (QM 22427), 1 specimen, 60 mm SL; Sta. 6 (QM 22436), 13 specimens, 39-66 mm SL; Sta. 10 (QM 22460), 6 specimens, 46-61 mm SL; Sta. 30 (QM 22535), 3 specimens, 21-44 mm SL; Sta. 32 (QM 22543), 9 specimens, 17-24 mm SL; Sta. 37 (QM 22405), 6 specimens, 22-71 mm SL; Sta. 41 (QM 22566), 11 specimens, 25-74 mm SL; Sta. 46 (QM 22580), 3 specimens, 35-37 mm SL; Sta. 49 (QM 22588), 1 specimen, 63 mm SL; Sta. 51 (QM 22602), 1 specimen, 68 mm SL; Sta. 53 (QM 22607), 10 specimens, 32-70 mm SL.

Vari (1978) reviewed the Indo-Pacific Terapontidae. Six genera and 33 species are restricted to fresh waters of Australia and New Guinea. *Amniataba percoides* is one of the most widely distributed freshwater species, ranging across the northern half of Australia.

Hannia greenwayi Vari

Hannia greenwayi Vari 1978: 244 (Hann River, Western Australia).
Hannia greenwayi. - Allen 1982: 46, pl. 10.

99 specimens: 41-101 mm SL. Sta. 14 (QM 22478), 6 specimens, 87-101 mm SL; Sta. 17 (QM 22488), 93 specimens, 41-82 mm SL.

The monotypic *Hannia* was previously known from a single collection of 101 specimens taken in the Hann River (Fitzroy River system) in the central Kimberley region. The specimens from the Calder and Isdell systems increase the range northwestward by about 130 km.

Hephaestus jenkinsi (Whitley)

Mesopristes jenkinsi Whitley 1945: 26 (Ord River, Western Australia).
Hephaestus jenkinsi. - Allen 1982: 47, pl. 10.

116 specimens: 35-183 mm SL. Sta. 9 (QM 22457), 27 specimens, 39-90 mm SL; Sta. 10 (QM 22462), 2 specimens, 49-127 mm SL; Sta. 13 (QM 22471), 13 specimens, 35-50 mm SL; Sta. 17 (QM 22487), 79 specimens, 35-183 mm SL; Sta. 23 (QM 22505), 1 specimen, 52 mm SL; Sta. 24 (QM 22512), 1 specimen, 42 mm SL; Sta. 30 (QM 22538), 1 specimen, 140 mm SL, Sta. 49 (QM 22590), 6 specimens, 44-58 mm SL.

The genus *Hephaestus* is represented by four Australian species (two shared with New Guinea) and seven New Guinean species. *H. jenkinsi* is mainly confined to the Kimberley region, but also occurs in a small portion of the adjacent Northern Territory.

Leiopotherapon unicolor (Günther)

Therapon unicolor Günther 1859: 277 (Gwydir River and Darling Downs, New South Wales).
Leiopotherapon unicolor. - Allen 1982: 49, pl. 10.

325 specimens: 29-117 mm SL. Sta. 2 (QM 22412), 5 specimens, 53-74 mm SL; Sta. 3 (QM 22418), 4 specimens, 54-89 mm SL; Sta. 8 (QM 22448), 2 specimens, 96-103 mm SL; Sta. 9 (QM 22458), 12 specimens, 47-82 mm SL; Sta. 10 (QM 22461), 21 specimens, 43-102 mm SL; Sta. 12 (QM 22467), 28 specimens, 35-84 mm SL; Sta. 13 (QM 22472), 6 specimens, 45-64 mm SL; Sta. 14 (QM 22479), 11 specimens, 51-82 mm SL; Sta. 16 (QM 22485), 35 specimens, 32-137 mm SL; Sta. 17 (QM 22489), 78 specimens, 35-116 mm SL; Sta. 18 (QM 22495), 5 specimens, 47-70 mm SL; Sta. 19 (QM 22498), 1 specimen, 65 mm SL: Sta. 23 (QM 22508), 8 specimens, 40-98 mm SL; Sta. 24 (QM 22510), 14 specimens, 38-112 mm SL; Sta. 26 (QM 22520), 6 specimens, 70-102 mm SL; Sta. 28 (QM 22527), 3 specimens, 39-87 mm SL; Sta. 29 (QM 22532), 4 specimens, 39-105 mm SL; Sta. 33 (QM 22546), 26 specimens, 31-75 mm SL; Sta. 37 (QM 22403), 20 specimens, 43-117 mm SL; Sta. 42 (QM 22568), 1 specimen, 44 mm SL; Sta. 43 (QM 22570), 5 specimens, 36-80 mm SL; Sta. 44 (QM 22574), 3 specimens, 29-31 mm SL; Sta. 46 (QM 22581), 6 specimens, 42-54 mm SL; Sta. 49 (QM 22589), 1 specimen, 72 mm SL; Sta. 50 (QM 22592), 1 specimen, 44 mm SL; Sta. 51 (QM 22603), 16 specimens, 43-101 mm SL.

This is one of the most widely distributed freshwater fishes in Australia. It occurs in most drainage systems throughout the northern two-thirds of the continent. It appears to survive drought periods, possibly by either burrowing or perhaps by laying drought-resistant eggs, but conclusive data is lacking.

Syncomistes butleri Vari

Syncomistes butleri Vari 1978: 311 (Lilly Lagoon, Northern Territory).
Syncomistes butleri. - Allen 1982: 50, pl. 11.

1 specimen: 121 mm SL (QM 22604, Sta. 52).

The genus *Syncomistes* contains four species of algal feeding teraponids that inhabit the Kimberley region and adjacent Northern Territory eastward to Arnhem Land. *S. butleri* is known from the eastern Kimberley and north-western Northern Territory to the South Alligator River.

Syncomistes rastellus Vari and Hutchins

Syncomistes rastellus Vari and Hutchins 1978: 1 (tributary of Gibb River, Western Australia.
Syncomistes rastellus. - Allen 1982: 51, pl. 11.

7 specimens: 40-102 mm SL. Sta 26 (QM 22522), 2 specimens, 91-102 mm SL; Sta. 49 (QM 22591), 5 specimens, 40-59 mm SL.

This species is known only from the Drysdale River system in the eastern Kimberley district. Prior to the 1986 collections only 24 specimens had been collected.

Syncomistes trigonicus Vari

Syncomistes trigonicus Vari 1978: 316 (Wyulda Creek, Western Australia).
Syncomistes trigonicus. - Allen 1982: 52, pl. 11.

3 specimens: 89-101 mm SL (QM 22521, Sta. 26).

This species is known only from the northern portion of the Kimberley region between the Prince Regent and Drysdale river systems.

Family Apogonidae — Cardinalfishes

Glossamia aprion (Richardson)

Apogon aprion Richardson 1842: 16 (King River, Western Australia).
Glossamia aprion. - Allen 1982: 52, pl. 12.

10 specimens: 23-70 mm SL. Sta. 30 (QM 22534), 5 specimens, 23-64 mm SL; Sta. 55 (QM 22611), 1 specimen, 70 mm SL; Sta. 56 (QM 22616), 1 specimen, 58 mm SL; Sta. 60 (QM 22622), 3 specimens, 40-42 mm SL.

The Apogonidae are primarily coral reef fishes, but members of *Glossamia* inhabit fresh waters of Australia and New Guinea. *G. aprion,* the only Australian representative, ranges widely across the north and southwards along the eastern coast to the Clarence River of northern New South Wales.

Family Toxotidae — Archerfishes

Toxotes chatareus (Hamilton)

Coius chatareus Hamilton 1822: 101 and 370 (Ganges River, India).
Toxotes chatareus. - Allen 1982: 54, pl. 12.

21 specimens: 41-51 mm SL. Sta. 17 (QM 22594), 19 specimens, 35-51 mm SL; Sta. 19 (QM 22598), 2 specimens, 41-46 mm SL.

Toxotidae are renowned for their ability to knock down insects from overhanging vegetation by squirting water from the mouth. Allen (1978b) reviewed the six species of

Toxotes, the only genus, which are mainly confined to the Indo-Australian Archipelago. *T. chatareus* is distributed in coastal areas and sometimes far inland throughout northern Australia between the Fitzroy River, Western Australia and Townsville, Queensland. It also ranges widely in the Indo-Australian Archipelago, and westward to India and Sri Lanka.

Toxotes oligolepis Bleeker

Toxotes oligolepis Bleeker 1876: 162 (Molucca Islands).
Toxotes oligolepis. - Allen 1982: 54, pl. 12.

7 specimens: 39-74 mm SL. Sta. 4 (QM 22426), 3 specimens, 39-52 mm SL; Sta. 8 (QM 22447), 1 specimen, 37 mm SL; Sta. 9 (QM 22455), 3 specimens, 42-74 mm SL.

This species is known from the Molucca Islands, Indonesia, and from the Fitzroy, Meda, May, and Isdell river systems in the western Kimberley region. It was also recorded from western New Guinea by Allen (1978), but the specimens were re-identified as *T. chatareus* by Allen and Boeseman (1982).

Family Eleotrididae — Gudgeons

Hypseleotris kimberleyensis Hoese and Allen

Hypseleotris kimberleyensis Hoese and Allen 1983: 252 (Barnett River, Western Australia).
Hypseleotris kimberleyensis. - Allen 1982: 57, pl. 13.

27 specimens: 29-37 mm SL (QM 22493, Sta. 17).

Eleotrididae is one of the largest families of freshwater fishes in the Australia-New Guinea region with approximately 50 species and many others that are partly marine in habit. *Hypseleotris* contains nine Australian species; those from Western Australia, including the Kimberley region were reviewed by Hoese and Allen (1983). *H. kimberleyensis* was previously known from 14 specimens from the Barnett River and Manning Creek Gorge in the central Kimberley district. The present specimens from the Calder River extend the range about 90 km westward.

Mogurnda mogurnda (Richardson)

Eleotris mogurnda Richardson 1844: 4 (Port Essington, Northern Territory).
Mogurnda mogurnda. - Allen 1982: 59, pl. 13.

114 specimens: 10-65 mm SL. Sta. 6 (QM 22434), 28 specimens, 10-45 mm SL; Sta. 7 (QM 22442), 1 specimen, 29 mm SL; Sta. 10 (QM 22464), 2 specimens, 33-52 mm SL; Sta. 17 (QM 22494), 6 specimens, 22-46 mm SL; Sta. 19 (QM 22499), 3 specimens, 17-30 mm SL; Sta. 21 (QM 22500), 8 specimens, 26-65 mm SL; Sta. 22 (QM 22503), 10 specimens, 12-25 mm SL; Sta. 23 (QM 22507), 1 specimen, 40 mm SL; Sta. 24 (QM 22511), 1 specimen, 28 mm SL; Sta. 27 (QM 22525), 1 specimen, 35 mm SL; Sta. 29 (QM 22531), 6 specimens, 10-48 mm SL; Sta. 30 (QM 22536), 1 specimen, 62 mm SL; Sta. 38 (QM 22559), 14 specimens, 12-37 mm SL; Sta. 40 (QM 22565), 29 specimens, 20-35 mm SL; Sta. 44 (QM 22575), 3 specimens, 30-54 mm SL.

Mogurnda, in the broad sense, contains about 22 species, most of which occur in fresh waters of New Guinea. The genus is currently being studied by Allen and Hoese. It is

divisible into several discrete units which appear to be deserving of at least subgeneric recognition; only one of these, typified by *M. mogurnda,* occurs in Australia where it is represented by five species (three undescribed). *M. mogurnda* ranges widely across northern Australia from the Kimberley region to the east coast of northern Queensland. It also occurs in the Lake Eyre drainage of central Australia.

Oxyeleotris sp. 1

Oxyeleotris lineolatus. - Allen 1982: 60, pl. 12.

5 specimens: 46-144 mm SL. Sta. 3 (QM 22422), 1 specimen, 53 mm SL; Sta. 13 (QM 22474), 1 specimen, 46 mm SL; Sta. 30 (QM 22539), 2 specimens, 95-144 mm SL; Sta. 55 (QM 22613), 1 specimen, 93 mm SL.

The identify of the two similar species of large (to about 450 mm SL) *Oxyeleotris* inhabiting northern Australian fresh waters has caused considerable confusion. The species treated here, which previous authors (including Allen 1982) have referred to as *O. lineolatus* is probably undescribed. The true *O. lineolatus* was referred to as *O. herwerdenii* by Allen (1982). Both species are widely distributed in northern Australia.

Oxyeleotris sp. 2

2 specimens: 90-100 mm SL; Sta. 7 (QM 22444).

According to gobioid specialist, D. F. Hoese of the Australian Museum this fish is an undescribed species which superficially resembles a species of *Bostrichthys.* In addition to the Keightly River specimens reported here, the species has been collected near Darwin.

Family Gobiidae — Gobies

Glossogobius giurus (Hamilton)

Gobius giurus Hamilton 1822: 51 (Gangetic Provinces, India).
Glossogobius giurus. - Allen 1982: 66, pl. 20.

148 specimens: 16-145 mm SL; Sta. 2 (QM 22411), 1 specimen, 42 mm SL; Sta. 3 (QM 22421), 29 specimens, 48-78 mm SL; Sta. 4 (QM 22428), 40 specimens, 45-89 mm SL; Sta. 6 (QM 22435), 1 specimen, 44 mm SL; Sta. 8 (QM 22449), 69 specimens, 16-53 mm SL; Sta. 12 (QM 22468), 1 specimen, 72 mm SL; Sta. 13 (QM 22473), 3 specimens, 46-69 mm SL; Sta. 14 (QM 22481), 5 specimens, 61-145 mm SL; Sta. 26 (QM 22523), 2 specimens, 64-90 mm SL; Sta. 30 (QM 22540), 1 specimen, 24 mm SL; Sta. 37 (QM 22404), 3 specimens, 62-103 mm SL; Sta. 53 (QM 22608), 2 specimens, 22-46 mm SL; Sta. 56 (QM 22617), 2 specimens, 29-111 mm SL.

Gobiidae is the world's largest family of marine fishes with an estimated 2,000 species. The group also contains many brackish and freshwater species. *Glossogobius* is the largest freshwater genus in the Australia-New Guinea region with approximately 30 species, including many that are undescribed. The genus is currently being studied by Hoese and Allen. *G. giurus* is widely distributed in the Indo-west Pacific and occurs throughout northern Australia.

Discussion

The freshwater fish fauna of Australia, excluding partial estuarine dwellers, contains about 180 species (Allen in press). About 80% of these fishes are endemic, although many are shared with neighbouring New Guinea, which because of its historical connection with the Australian landmass can be considered zoogeographically as part of Australia. Endemicity is also significant at the generic level (about 60%), but the only endemic families are Lepidogalaxiidae, Ceratodidae (lungfish), Melanotaeniidae (rainbowfishes), and Pseudomugilidae (blue-eyes). The northern or tropical fauna contains about two-thirds of Australia's freshwater fishes. The distribution patterns of the majority of northern fishes can be divided into the following categories: (1) northern Australia and central part of New Guinea (see Allen and Hoese 1980) — 34 species; (2) Kimberley and far north of Northern Territory — 22 species; (3) eastern Queensland —16 species; (4) relatively widespread in northern Australia — 13 species; (5) central Australia — 11 species; (6) Gulf of Carpentaria drainage — 4 species. Thus the Kimberley is the only region of Northern Australia exhibiting substantial endemicity.

Eighteen of 48 species or approximately 38% of its fishes are endemics (Table 1). The above analysis excludes species which are partly estuarine such as the barramundi (*Lates calcarifer*) and a number of gobioid fishes.

Why have more endemic species evolved in the Kimberley region than in other areas? Part of the answer to this question may be found in its rugged topography and high rainfall, the latter contributing to the former in that deeply eroded gorges and waterfalls are effective isolating mechanisms. Furthermore, long isolation of the region in general is evident from a glance of a topographic map of Australia. The area is mostly surrounded by either sea or low relief desert. The only exception is the relatively narrow corridor of high rainfall that connects the Kimberley with the northernmost section of the Northern Territory. However, these areas might have been separated in past geological eras by such phenomena as drought or marine incursions.

It seems likely that the Kimberley region may have functioned as a refugia. According to Heatwole (1987) "the cyclic fluctuation of Australian climate in the late Cainozoic, superimposed upon a generally increasing and spreading aridity, provided conditions under which refugia played an important role in the distribution and speciation of animals." Therefore the the wetter Kimberley region could have served as refugia that allowed populations to survive, and further speciate when surrounding areas became progressively drier. Within the Kimberley region itself the highly dissected landscape has promoted the isolation of neighbouring drainage systems. The numerous gorges with their large, deep permanent waterholes could have been refugia that served as centres of speciation during periods of fluctuating environments. Unfortunately there is no fossil information that would facilitate an estimation of speciation events in any of the Kimberley fish families.

Four families are involved in the extensive speciation that has occured in Kimberley fishes: (1) Melanotaeniidae — 2 endemics); (2) Atherinidae — 2 endemics; (3) Teraponidae — 8 endemics; and (4) Eleotrididae — 6 endemics. There are also two endemic genera in the region: the terapontid *Hannia* Vari and the eleotridid

Table 1 Summary of Freshwater Fishes of the Kimberley Region
(*species that are endemic or mainly distributed in Kimberley region marked with asterisk)

Family	Species
Anguillidae	*Anguilla bicolor* McClelland
Clupeidae	*Nematalosa erebi* (Günther)
Ariidae	*Arius graeffei* Kner & Steindachner
	A. midgleyi Kailola & Pierce
Plotosidae	*Anodontiglanis dahli* Rendahl
	Neosilurus ater (Perugia)
	Neosilurus hyrtlii (Steindachner)
	Neosilurus sp.
	Porochilus rendahli Whitley
Belonidae	*Strongylura krefftii* (Günther)
Melanotaeniidae	*Melanotaenia exquisita* Allen
	**M. gracilis* Allen
	M. nigrans (Richardson)
	**M. pygmaea* Allen
	M. splendida australis (Castelnau)
Ahterinidae	**Craterocephalus helenae* Ivantsoff, Crowley & Allen
	**C. lentiginosus* Ivantsoff, Crowley, & Allen
	Quirichthys stramineus (Whitley)
Synbranchidae	*Ophisternon gutturale* (Richardson)
Chandidae	*Ambassis macleayi* Castelnau
	A. mulleri Klunzinger
	Parambassis gulliveri (Castelnau)
Terapontidae	*Amniataba percoides* (Günther)
	**Hannia greenwayi* Vari
	**Hephaestus epirrhinos* Vari & Hutchins
	**H. jenkinsi* (Whitley)
	**Leiopotherapon macrolepis* Vari
	L. unicolor (Günther)
	**Syncomistes butleri* Vari
	**S. kimberleyensis* Vari
	**S. rastellus* Vari & Hutchins
	**S. trigonicus* Vari
Apogonidae	*Glossamia aprion* (Richardson)
Toxotidae	Toxotes chatareus (Hamilton)
	T. oligolepis Bleeker
Eleotrididae	*Hypseleotris compressa* (Krefft)
	**H. ejuncida* Hoese & Allen
	**H. kimberleyensis* Hoese & Allen
	**H. regalis* Hoese & Allen
	**Kimberleyeleotris hutchinsi* Hoese & Allen
	**K. notata* Hoese & Allen
	Mogurnda mogurnda (Richardson)
	**Mogurnda* sp.
	Oxyeleotris lineolatus (Steindachner)
	Oxyeleotris sp. 1
	Oxyeleotris sp. 2
Gobiidae	*Glossogobius aureus* Akihito & Meguro
	G. giurus (Hamilton)

Kimberleyeleotris Hoese and Allen. All of the endemic species appear to have evolved from the same ancestral stock as fishes that have their primary distribution to the east of the Kimberley region and therefore the general dispersal route is believed to have been from this direction. For example, the endemic teraponid genus *Syncomistes* is believed to have evolved from a common ancestor of *Pingalla,* represented by three species that are distributed in north coastal drainages of the Northern Territory and Gulf of Carpentaria (Vari 1978).

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References

Allen, G.R. (1975). A preliminary checklist of the freshwater fishes of the Prince Regent Reserve, north-west Kimberley, Western Australia. *In* J. M. Miles & A. A. Burbidge (eds), 'A biological survey of the Prince Regent River Reserve, north-west Kimberley, Western Australia in August 1974', *Widl. Res. Bull. W. Aust.* 3: 89-96 (W. Aust. Dept Fish. Wildl.).

Allen, G.R. (1978a). The rainbowfishes of northwestern Australia (Family Melanotaeniidae). Trop. Fish Hobbyist, 26 (June): 91-102.

Allen, G.R. (1978b). A review of the archerfishes (Family Toxotidae). *Rec. West. Aust. Mus.,* **6**(4): 355-378.

Allen, G.R. (1982). *A Field Guide to Inland Fishes of Western Australia.* Western Australian Museum, 86 pp.

Allen, G.R. (1989). *Freshwater fishes of Australia.* T.F.H. Publications, New Jersey (USA): 200 pp.

Allen, G.R. & Boeseman, M. (1982). A collection of freshwater fishes from western New Guinea with descriptions of two new species (Gobiidae and Eleotridae). *Rec. West. Aust. Mus.,* **10**(2): 67-103.

Allen, G.R. & Burgess, W.E. (in press). A review of the glassfishes (Chandidae) of Australia and New Guinea. *Suppl. Rec. West. Aust.*

Allen, G.R. & Cross, N.J. (1982). *Rainbowfishes of Australia and Papua New Guinea.* T.F.H. Publications, New Jersey (USA): 141 pp.

Allen, G.R. & Hoese, D.F. (1980). A collection of fishes from the Jardine River, Cape York Peninsula, Australia. *J. Roy. Soc. West. Aust.,* **63**(2): 53-61.

Bleeker, P. (1876). Sur la pluralite des especes insulindiennes de *Toxotes. Versl. Akad. Amst.* (**2**)9: 155-167.

Castelnau, F.L. (1875). Researches on the fishes of Australia. *Philad. Cent. Exhib.* 1876. *Intercolonial Exhib. Essays* No. **2**: 1-52.

Castelnau, F.L. (1978). Notes on the fishes of the Norman River. *Proc. Linn. Soc. N.S.W.,* **3**: 41-51.

Günther, A.C. (1859). *Catalogue of the Acanthopterygian fishes in the collection of the British Museum.* Vol. I. London : British Museum. 524 pp.

Günther, A.C. (1864). Description of three new species of fishes in the collection of the British Museum. *Ann. Mag. nat. Hist.* **14**: 374-76.

Günther, A.C. (1868). *Catalogue of the fishes in the British Museum.* Vol. 7. London: British Museum. 512 pp.

Hamilton, F. (1822). *An account of the fishes found in the river Ganges and its branches.* Edinburgh : Archibald Constable & Co.

Heatwole, H. (1987). 5. Major components and distributions of the terrestrial fauna. *In:* Fauna of Australia, Vol. 1A, General Articles. Australian Government Publishing Service : Canberra, pp. 101-135.

Hoese, D.F. & Allen, G.R. (1983). A review of the gudgeon genus *Hypseleotris* (Pisces : Eleotridae) of Western Australia, with descriptions of three new species. *Rec. West. Aust. Mus.*, **10**(3): 243-261, figs. 1-6

Hutchins, J.B. (1977). The freshwater fish fauna of the Drysdale River National Park, North Kimberley, Western Australia. *In.* E. D. Kabay & A. A. Burbidge (eds). 'A biological survey of the Drysdale River National Park in August 1975', *Wildl. Res. Bull. W. Aust.* **6**: 102-109.

Hutchins, J.B. (1981). Part 7. Freshwater fish fauna of the Mitchell Plateau area, Kimberley, Western Australia. *In.* Biological survey of Mitchell Plateau and Admiralty Gulf, Kimberley, Western Australia. *West. Aust. Mus. Publ:* 229-247.

Ivantsoff, W. (1978). Taxonomic and systematic reviews of the Australian fish species of the family Atherinidae with references to related species of the old world. Unpublished Ph.D. Thesis, Macquarie University, Sydney. 701 pp., 118 figs.

Ivantsoff, W., Crowley, L. & Allen, G.R. (1987). Descriptions of three new species and one subspecies of freshwater hardyhead (Pisces: Atherinidae: *Craterocephalus*) from Australia. *Rec. West. Aust. Mus.* **13**(2): 171-188.

Klunzinger, C.B. (1879). Die von Muller'sche Sammlung australischer Fische in Stuttgart. *Sitzungsb. K. Akad. Wiss. Wien.*, **80**: 325-340.

McDowall, R.M. & Frankenberg, R.S. (1981). The galaxiid fishes of Australia. *Rec. Aust. Mus.* **33**(10): 443-605.

Merrick, J.R. & Schmida, G.E. (1984). *Australian Freshwater Fishes.* Netley, South Australia : Griffin Press Ltd., 409 pp., 280 pls.

Nelson, G. & Rothman, M.N. (1973). The species of gizzard shads (Dorosomatinae) with particular reference to the Indo-Pacific region. *Bull. Am. Mus. Nat. Hist.* **150**(2): 131-206.

Richardson, J. (1842). Contribution to the ichthyology of Australia. *Ann. Mag. nat. Hist.* **9**: 15-31.

Richardson, J. (1843). Contributions to the ichthyology of Australia. *Ann. Mag. nat. Hist.* (1) **11**(69): 169-182.

Richardson, J. (1844). Ichthyology of the voyage of H.M.S. *Erebus*$_5$ and *Terror. Zool. Voy. Erebus and Terror* **2**: 1-139.

Said, B., Ivantsoff, W. & Allen, G.R. (in press). A revision of the fish family Pseudomugilidae. *Aust. J. Fresh Water & Mar. Res.*

Steindachner, F. (1867). Uber einige Fische aus dem Fitzroy-Flusse bei Rockhampton in Ost. Australien. *Sitz. K. Akad. Wiss. Wien.* **55**(1): 9-16.

Vari, R.P. (1978). The Terapon perches (Percoidei; Teraponidae), a cladistic analysis and taxonomic revision. *Bull. Am. Mus. nat. Hist.* **159**: 174-340.

Vari, R.P. & Hutchins, J.B. (1978). New species of *Terapon* perches (Percoidei, Teraponidae) from Australia. *Am. Mus. Noviates* **2654**: 1-8.

Whitley, G.P. (1945). New sharks and fishes from Western Australia (Part 2). *Aust. Zool.* **11**: 1-42.

Whitley, G.P. (1950). Studies in Ichthyology, No. 14. *Rec. Aust. Mus.* **22**(3): 234-245.

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